Complete Summary

GUIDELINE TITLE

Strategies to prevent ventilator-associated pneumonia in acute care hospitals.

BIBLIOGRAPHIC SOURCE(S)

Coffin SE, Klompas M, Classen D, Arias KM, Podgorny K, Anderson DJ, Burstin H, Calfee DP, Dubberke ER, Fraser V, Gerding DN, Griffin FA, Gross P, Kaye KS, Lo E, Marschall J, Mermel LA, Nicolle L, Pegues DA, Perl TM, Saint S, Salgado CD, Weinstein RA, Wise R, Yokoe DS. Strategies to prevent ventilator-associated pneumonia in acute care hospitals. Infect Control Hosp Epidemiol 2008 Oct;29 Suppl 1:S31-40. PubMed

GUIDELINE STATUS

This is the current release of the guideline.

COMPLETE SUMMARY CONTENT

SCOPE

DISEASE/CONDITION(S)

Ventilator-associated pneumonia (VAP)

GUIDELINE CATEGORY

Prevention
Risk Assessment

CLINICAL SPECIALTY

Critical Care
Infectious Diseases
Internal Medicine
Nursing
Preventive Medicine
Pulmonary Medicine
Surgery

INTENDED USERS

Advanced Practice Nurses
Allied Health Personnel
Hospitals
Nurses
Physician Assistants
Physicians
Respiratory Care Practitioners
Utilization Management

GUIDELINE OBJECTIVE(S)

To highlight practical recommendations in a concise format designed to assist acute care hospitals in implementing and prioritizing their ventilator-associated pneumonia (VAP) prevention efforts

TARGET POPULATION

Patients in acute care hospitals with an endotracheal tube for mechanical ventilation

INTERVENTIONS AND PRACTICES CONSIDERED

1. Basic practices for prevention and monitoring of ventilator-associated pneumonia (VAP) including:
    - Healthcare personnel education
    - Surveillance of VAP
    - Implementing practices for disinfection and sterilization of respiratory equipment, maintaining patients in a semirecumbent position, antiseptic oral care
    - Assignment of accountability
2. Special approaches for prevention of VAP in hospitals with unacceptably high rates of VAP including:
    - Using an endotracheal tube with in-line and subglottic suctioning for all eligible patients
    - Ensuring that all intensive care unit (ICU) beds used for patients undergoing ventilation have a built-in tool to provide continuous monitoring of the angle of incline

The following approaches should not be considered a routine part of VAP prevention:

- Routine administration of intravenous immunoglobulin, white-cell-stimulating factors (filgrastim or sargramostim), enteral glutamine, or chest physiotherapy

- Routine use of rotational therapy with kinetic or continuous lateral rotational therapy beds
- Routine administration of prophylactic aerosolized or systemic antimicrobials

MAJOR OUTCOMES CONSIDERED

- Incidence density of VAP, reported as the number of episodes of VAP per 1,000 ventilator-days
- Length of hospitalization (days)
- Length of mechanical ventilation (days)
- Morbidity
- Mortality
- Healthcare resource utilization
- Cost

METHODOLOGY

METHODS USED TO COLLECT/SELECT EVIDENCE

Searches of Electronic Databases

DESCRIPTION OF METHODS USED TO COLLECT/SELECT THE EVIDENCE

For this compendium, the Society for Healthcare Epidemiology of America/Infectious Diseases Society of America (SHEA/IDSA) reviewed previously published guidelines and recommendations relevant to each section and performed computerized literature searches using PubMed. Searches of the English-language literature focused on human studies published after existing guidelines through 2007, using the subject headings listed in Table 2 of the Compendium document (see "Availability of Companion Documents" field).

NUMBER OF SOURCE DOCUMENTS

Not stated

METHODS USED TO ASSESS THE QUALITY AND STRENGTH OF THE EVIDENCE

Weighting According to a Rating Scheme (Scheme Given)

RATING SCHEME FOR THE STRENGTH OF THE EVIDENCE

Quality of Evidence*

I. Evidence from ≥1 properly randomized, controlled trial
II. Evidence from ≥1 well-designed clinical trial without randomization, from cohort or case-controlled analytic studies (preferably from >1 center), from multiple time-series studies, or from dramatic results of uncontrolled experiments
III. Evidence from opinions of respected authorities based on clinical experience, descriptive studies, or reports of expert committees

*Adapted from the Canadian Task Force on the Periodic Health Examination.

METHODS USED TO ANALYZE THE EVIDENCE

Review of Published Meta-Analyses
Systematic Review

DESCRIPTION OF THE METHODS USED TO ANALYZE THE EVIDENCE

In evaluating the evidence regarding the prevention and monitoring of healthcare-associated infections (HAIs), the HAI Allied Task Force followed a process used in the development of other Infectious Diseases Society of America (IDSA) guidelines, including a systematic weighting of the quality of the evidence and the grade of recommendation (see the "Rating Scheme for the Strength of the Evidence" and "Rating Scheme for the Strength of the Recommendations" fields).

METHODS USED TO FORMULATE THE RECOMMENDATIONS

Expert Consensus

DESCRIPTION OF METHODS USED TO FORMULATE THE RECOMMENDATIONS

Society for Healthcare Epidemiology of America (SHEA) and the Infectious Diseases Society of America (IDSA) Standards and Practice Guidelines Committee convened experts in the prevention and monitoring of healthcare-associated infections (HAIs).

The HAI Allied Task Force met on 17 occasions via teleconference to complete the compendium. The purpose of the teleconferences was to discuss the questions to be addressed, make writing assignments, and discuss recommendations. All members of the HAI Allied Task Force participated in the preparation and review of the draft documents. The compendium was then submitted to a subgroup of the HAI Allied Task Force with implementation expertise that, through a series of additional teleconferences and communications, performed extensive editing and reformatting to create implementation-focused text.

RATING SCHEME FOR THE STRENGTH OF THE RECOMMENDATIONS

Strength of Recommendation*

A. Good evidence to support a recommendation for use
B. Moderate evidence to support a recommendation for use
C. Poor evidence to support a recommendation

*Adapted from the Canadian Task Force on the Periodic Health Examination.

COST ANALYSIS

Guideline developers reviewed published cost analyses.

METHOD OF GUIDELINE VALIDATION

External Peer Review
Internal Peer Review

DESCRIPTION OF METHOD OF GUIDELINE VALIDATION

Review and Approval Process

A critical stage in the development process is peer review. Peer reviewers are relied on for expert, critical, and unbiased scientific appraisals of the documents. The Society for Healthcare Epidemiology of America/Infectious Diseases Society of America (SHEA/IDSA) employed a process used for all SHEA/IDSA guidelines that includes a multilevel review and approval. Comments were obtained from several outside reviewers who complied with the SHEA/IDSA policy on conflict of interest disclosure. In addition, 8 stakeholder organizations provided comments on the document. Finally, the guideline was reviewed and approved by the IDSA Standards and Practice Guidelines Committee and the Board of Directors of the SHEA and the IDSA prior to dissemination.

RECOMMENDATIONS

MAJOR RECOMMENDATIONS

Recommendations for Implementing Prevention and Monitoring Strategies

Recommendations for preventing and monitoring ventilator-associated pneumonia (VAP) are summarized below. They are designed to assist acute care hospitals in prioritizing and implementing their VAP prevention efforts.

Each recommendation includes a ranking for the strength and the quality of evidence supporting it. Definitions of the levels of evidence (I-III) and grades of recommendation (A-E) are provided at the end of the "Major Recommendations" field.

Basic Practices for Prevention and Monitoring of VAP: Recommended for All Acute Care Hospitals

Education

1. Educate healthcare personnel who care for patients undergoing ventilation about VAP, including information about the following (**A-II**):
    - Local epidemiology
    - Risk factors
    - Patient outcomes

2. Educate clinicians who care for patients undergoing ventilation about noninvasive ventilatory strategies (**B-III**).

Surveillance of VAP

1. Perform direct observation of compliance with VAP-specific process measures (**B-III**).
    - VAP-specific process measures include hand hygiene, bed position, daily sedation interruption and assessment of readiness to wean, and regular oral care.
    - Use structured observation tools at regularly scheduled intervals.

2. Conduct active surveillance for VAP and associated process measures in units that care for patients undergoing ventilation who are known or suspected to be at high risk for VAP on the basis of risk assessment (**A-II**).
    - Collect data that will support the identification of patients with VAP and calculation of VAP rates (i.e., the number of VAP cases and number of ventilator-days for all patients who are undergoing ventilation and in the population being monitored).

Practice

1. Implement policies and practices for disinfection, sterilization, and maintenance of respiratory equipment that are aligned with evidence-based standards (e.g., guidelines from the Centers for Disease Control and Prevention and professional organizations) (**A-II**) (Tablan et al., 2004).
    - See the Appendix in the original guideline document for a list of recommended practices.

2. Ensure that all patients (except those with medical contraindications) are maintained in a semirecumbent position (**B-II**).
3. Perform regular antiseptic oral care in accordance with product guidelines (**A-I**).
4. Provide easy access to noninvasive ventilation equipment and institute protocols to promote the use of noninvasive ventilation (**B-III**).

Accountability

1. The hospital's chief executive officer and senior management are responsible for ensuring that the healthcare system supports an infection prevention and control program to effectively prevent VAP.
2. Senior management is accountable for ensuring that an adequate number of trained personnel are assigned to the infection prevention and control program.
3. Senior management is accountable for ensuring that healthcare personnel, including licensed and nonlicensed personnel, are competent to perform their job responsibilities.
4. Direct healthcare providers (such as physicians, nurses, aides, and therapists) and ancillary personnel (such as housekeeping and equipment-processing personnel) are responsible for ensuring that appropriate infection prevention and control practices are used at all times (including hand hygiene, standard and isolation precautions, cleaning and disinfection of equipment and the environment, aseptic techniques when suctioning secretions and handling respiratory therapy equipment, patient positioning, sedation and weaning protocols, and oral care).

5. Hospital and unit leaders are responsible for holding their personnel accountable for their actions.
6. The person who manages the infection prevention and control program is responsible for ensuring that an active program to identify VAP is implemented, that data on VAP are analyzed and regularly provided to those who can use the information to improve the quality of care (e.g., unit staff, clinicians, and hospital administrators), and that evidence-based practices are incorporated into the program.
7. Personnel responsible for healthcare personnel and patient education are accountable for ensuring that appropriate training and educational programs to prevent VAP are developed and provided to personnel, patients, and families.
8. Personnel from the infection prevention and control program, the laboratory, and information technology departments are responsible for ensuring that systems are in place to support the surveillance program.

Special Approaches for the Prevention of VAP

Perform a VAP risk assessment. These special approaches are recommended for use in locations and/or populations within the hospital that have unacceptably high VAP rates despite implementation of the basic VAP prevention procedures listed above.

1. Use an endotracheal tube with in-line and subglottic suctioning for all eligible patients (**B-II**).
2. Ensure that all intensive care unit (ICU) beds used for patients undergoing ventilation have a built-in tool to provide continuous monitoring of the angle of incline (**B-III**).

Approaches That Should Not Be Considered a Routine Part of VAP Prevention

1. Do not routinely administer intravenous immunoglobulin (Tablan et al., 2004), white-cell–stimulating factors (filgrastim or sargramostim) (Tablan et al., 2004), enteral glutamine (Tablan et al., 2004), or chest physiotherapy (Tablan et al., 2004; Ntoumenopoulos et al., 2002). (**A-III**)
2. Do not routinely use rotational therapy with kinetic or continuous lateral rotational therapy beds (**B-II**) (Tablan et al., 2004; Goldhill et al., 2007).
3. Do not routinely administer prophylactic aerosolized or systemic antimicrobials (**B-III**) (Richards et al., 2000; Tablan et al., 2004; Hoth et al., 2003).

Unresolved Issues

1. Avoidance of H2 antagonist or proton pump inhibitors for patients who are not at high risk for developing gastrointestinal bleeding (Collard, Saint, & Matthay, 2003; Cook, 1995; Cook et al., 1996; Cook et al., 1998; Khan, Doctor, & Rubenfeld, 2006; Kantorova et al., 2004; Yildizdas, Yapicioglu, & Yilmaz, 2002; Levy et al., 1997)
2. Selective digestive tract decontamination for all patients undergoing ventilation (Liberati et al., 2004; van Nieuwenhoven et al.,2001; Bonten, 2006; de Jonge et al., 2003; Krueger et al., 2002; Silvestri et al., 2007

3. Use of antiseptic-impregnated endotracheal tubes (Pacheco-Fowler et al., 2004; Berra et al., 2004)
4. Intensive glycemic control (Collier et al., 2005; van den Berghe et al., 2001; Toschlog et al., 2007; Brunkhorst et al., 2008)

Definitions:

Quality of Evidence*

I. Evidence from ≥1 properly randomized, controlled trial
II. Evidence from ≥1 well-designed clinical trial without randomization, from cohort or case-controlled analytic studies (preferably from >1 center), from multiple time-series studies, or from dramatic results of uncontrolled experiments
III. Evidence from opinions of respected authorities based on clinical experience, descriptive studies, or reports of expert committees

Strength of Recommendation*

A. Good evidence to support a recommendation for use
B. Moderate evidence to support a recommendation for use
C. Poor evidence to support a recommendation

*Adapted from the Canadian Task Force on the Periodic Health Examination.

CLINICAL ALGORITHM(S)

None provided

EVIDENCE SUPPORTING THE RECOMMENDATIONS

REFERENCES SUPPORTING THE RECOMMENDATIONS

References open in a new window

TYPE OF EVIDENCE SUPPORTING THE RECOMMENDATIONS

The type of supporting evidence is identified and graded for each recommendation (see "Major Recommendations").

The recommendations in this guideline are largely based on previously published healthcare-associated infection (HAI) prevention guidelines available from a number of organizations, including the Healthcare Infection Control Practices Advisory Committee and the Centers for Disease Control and Prevention, Society for Healthcare Epidemiology of America (SHEA), the Infectious Diseases Society of America (IDSA), and the Association for Professionals in Infection Control and Epidemiology, and relevant literature published after these guidelines.

BENEFITS/HARMS OF IMPLEMENTING THE GUIDELINE RECOMMENDATIONS

POTENTIAL BENEFITS

Appropriate use of ventilation leading to prevention of ventilator-associated pneumonia (VAP) in acute care hospitals

POTENTIAL HARMS

Not stated

QUALIFYING STATEMENTS

QUALIFYING STATEMENTS

Recommendations that might ordinarily be included in a guideline with a C-level strength of recommendation were excluded from the recommendations and are discussed in the "unresolved issues" sections (see original guideline document); this was done to help hospitals to focus their implementation efforts on the most strongly recommended prevention practices. Hospitals can prioritize their efforts by initially focusing on implementation of the prevention approaches listed as basic practices recommended for all acute care hospitals. If healthcare-associated infection (HAI) surveillance or other risk assessments suggest that there is ongoing transmission despite implementation of basic practices, hospitals should then consider adopting some or all of the prevention approaches listed under the "special approaches" section of this document. These can be implemented within specific locations or patient populations or can be implemented hospital wide, depending on outcome data, risk assessment, and/ or local requirements. Most of the special approaches listed in this document are supported by studies based on the control of HAI outbreaks and require additional personnel and financial resources for implementation.

The following issues remain unresolved:

- Avoidance of H2 antagonist or proton pump inhibitors for patients who are not at high risk for developing gastrointestinal bleeding
- Selective digestive tract decontamination for all patients undergoing ventilation
- Use of antiseptic-impregnated endotracheal tubes
- Intensive glycemic control

IMPLEMENTATION OF THE GUIDELINE

DESCRIPTION OF IMPLEMENTATION STRATEGY

An implementation strategy was not provided.

IMPLEMENTATION TOOLS

Audit Criteria/Indicators
Foreign Language Translations
Patient Resources

For information about availability, see the "Availability of Companion Documents" and "Patient Resources" fields below.

INSTITUTE OF MEDICINE (IOM) NATIONAL HEALTHCARE QUALITY REPORT CATEGORIES

IOM CARE NEED

Staying Healthy

IOM DOMAIN

Effectiveness
Patient-centeredness
Safety

IDENTIFYING INFORMATION AND AVAILABILITY

BIBLIOGRAPHIC SOURCE(S)

Coffin SE, Klompas M, Classen D, Arias KM, Podgorny K, Anderson DJ, Burstin H, Calfee DP, Dubberke ER, Fraser V, Gerding DN, Griffin FA, Gross P, Kaye KS, Lo E, Marschall J, Mermel LA, Nicolle L, Pegues DA, Perl TM, Saint S, Salgado CD, Weinstein RA, Wise R, Yokoe DS. Strategies to prevent ventilator-associated pneumonia in acute care hospitals. Infect Control Hosp Epidemiol 2008 Oct;29 Suppl 1:S31-40. PubMed

ADAPTATION

Not applicable: The guideline was not adapted from another source.

DATE RELEASED

2008 Oct

GUIDELINE DEVELOPER(S)

Infectious Diseases Society of America - Medical Specialty Society
Society for Healthcare Epidemiology of America - Professional Association

SOURCE(S) OF FUNDING

Society for Healthcare Epidemiology of America (SHEA)/Infectious Diseases Society of America (IDSA)

GUIDELINE COMMITTEE

Healthcare-Associated Infections Task Force

COMPOSITION OF GROUP THAT AUTHORED THE GUIDELINE

Primary Authors: Susan E. Coffin, MD, MPH; Michael Klompas, MD; David Classen, MD, MS; Kathleen M. Arias, MS, CIC; Kelly Podgorny, RN, MS, CPHQ; Deverick J. Anderson, MD, MPH; Helen Burstin, MD; David P. Calfee, MD, MS; Erik R. Dubberke, MD; Victoria Fraser, MD; Dale N. Gerding, MD; Frances A. Griffin, RRT, MPA; Peter Gross, MD; Keith S. Kaye, MD; Evelyn Lo, MD; Jonas Marschall, MD; Leonard A. Mermel, DO, ScM; Lindsay Nicolle, MD; David A. Pegues, MD; Trish M. Perl, MD; Sanjay Saint, MD; Cassandra D. Salgado, MD, MS; Robert A. Weinstein, MD; Robert Wise, MD; Deborah S. Yokoe, MD, MPH

Task Force Members: David Classen, MD, MS; Infectious Diseases Society of America Co-Chair (University of Utah, Salt Lake City, UT); Deborah S. Yokoe, MD, MPH; Society for Healthcare Epidemiology of America Co-Chair (Brigham & Women's Hospital and Harvard Medical School, Boston, MA); Deverick J. Anderson, MD, MPH; Section Leader, Surgical Site Infection (Duke University Medical Center, Durham, NC); Kathleen M. Arias, MS, CIC; Association for Professionals in Infection Control and Epidemiology liaison, Implementation Subgroup (Association for Professionals in Infection Control and Epidemiology, Washington, DC); Helen Burstin, MD; National Quality Forum liaison (National Quality Forum, Washington, DC); David P. Calfee, MD, MS; Section Leader, Methicillin-Resistant S. aureus (Mount Sinai School of Medicine, New York, NY); Susan E. Coffin, MD, MPH; Section Leader, Ventilator- Associated Pneumonia (Children's Hospital of Philadelphia and University of Pennsylvania School of Medicine, Philadelphia, PA); Erik R. Dubberke, MD; Section Leader, C. difficile–Associated Disease (Washington University School of Medicine, St. Louis, MO); Victoria Fraser, MD; Society for Healthcare Epidemiology of America President (Washington University School of Medicine, St. Louis, MO); Dale N. Gerding, MD; Section Leader, C. difficile–Associated Disease (Hines Veterans Affairs Medical Center, Hines, IL, and Loyola University Chicago Stritch School of Medicine, Chicago, IL); Frances A. Griffin, RRT, MPA; Institute for Healthcare Improvement liaison (The Institute for Healthcare Improvement, Cambridge, MA); Peter Gross, MD (Hackensack University Medical Center, Hackensack, NJ and the University of Medicine and Dentistry of New Jersey–New Jersey Medical School, Newark, NJ); Keith S. Kaye, MD; Section Leader, Surgical Site Infection (Duke University Medical Center, Durham, NC); Michael Klompas, MD; Section Leader, Ventilator-Associated Pneumonia (Brigham & Women's Hospital and Harvard Medical School, Boston, MA); Evelyn Lo, MD; Section Leader, Catheter-Associated Uri nary Tract Infection (University of Manitoba and St. Boniface General Hospital, Winnipeg, Manitoba, Canada); Jonas Marschall, MD; Section Leader, Catheter-Associated Bloodstream Infection (Washington University School of Medicine, St. Louis, MO); Leonard A. Mermel, DO, ScM; Section Leader, Catheter- Associated Bloodstream Infection (Warren Alpert Medical School of Brown University and Rhode Island Hospital, Providence, RI); Lindsay Nicolle, MD; Section Leader, Catheter-Associated Urinary Tract Infection (University of Manitoba and Health Sciences Center, Winnipeg, Manitoba, Canada); David A. Pegues, MD; Healthcare Infection Control Practices Advisory Committee liaison (David Geffen School of Medicine at the University of California Los Angeles, Los Angeles, CA); Trish M. Perl, MD (Johns Hopkins Medical Institutions and University, Baltimore, MD); Kelly Podgorny, RN, MS, CPHQ; The Joint Commission liaison, Implementation

Subgroup (The Joint Commission, Oakbrook Terrace, IL); Sanjay Saint, MD (Ann Arbor Veterans Affairs Medical Center and University of Michigan Medical School, Ann Arbor, MI); Cassandra D. Salgado, MD, MS; Section Leader, Methicillin-Resistant S. aureus (Medical University of South Carolina, Charleston, SC); Robert A. Weinstein, MD (Stroger [Cook County] Hospital and Rush University Medical Center, Chicago, IL); Robert Wise, MD; The Joint Commission liaison (The Joint Commission, Oakbrook Terrace, IL)

FINANCIAL DISCLOSURES/CONFLICTS OF INTEREST

All members of the Healthcare-Associated Infections (HAI) Allied Task Force and the external peer reviewers complied with the Infectious Diseases Society of America (IDSA) policy on conflicts of interest, which requires disclosure of any financial or other interest within the past 2 years that might be construed as constituting an actual, potential, or apparent conflict. Members of the HAI Allied Task Force and the external reviewers were provided with the IDSA conflicts of interest disclosure statement and were asked to identify ties to companies developing products that might be affected by promulgation of the compendium. Information was requested regarding employment, consultancies, stock ownership, honoraria, research funding, expert testimony, and membership on company advisory committees. The task force made decisions on a case-by-case basis as to whether an individual's role should be limited as a result of a conflict.

D.S.Y. has received a research grant from Sage Products. L.A.M. has received research grants from and served as a consultant to 3M, Angiotech, and Cadence and is a consultant to Ash Access Technology. D.J.A. has received a research grant from Pfizer and has served on advisory councils for Schering-Plough and Pfizer. K.M.A. is the immediate past president of the Association for Professionals in Infection Control and Epidemiology and serves on its board of directors. H.B.'s participation does not represent official endorsement of the compendium by the National Quality Forum. D.P.C. is a member of the speakers' bureau for Enturia. S.E.C. has received a research grant from Merck. E.R.D. is a member of the speakers' bureaus for Elan, Enzon, Schering-Plough, Viropharma, Pfizer, and Astellas and serves on the advisory boards of Schering-Plough, Genzyme, and Salix. V.F. is the past president of the Society for Healthcare Epidemiology of America, has been a consultant to Steris, Verimetrix, and Merck, and is a member of the speakers' bureaus for Cubist and Merck. P.G. has received a research grant from Becton, Dickinson and Company (BD); has been on the speakers' bureau for Ortho-McNeil; and served on the Zostervax advisory board of Merck. K.S.K has received research grants from Pfizer, Merck, and Cubist; is a member of the speakers' bureaus for Pfizer, Merck, Cubist, Schering-Plough, and Wyeth; and serves on the advisory board for Schering- Plough. J.M. has received a research grant from the Swiss National Science Foundation. T.M.P. is a past president of the Society for Healthcare Epidemiology of America; is on the advisory board or the speakers' bureau for Theradoc, 3M, Replydine, and Ortho-McNeil; and has received honoraria from VHA and the Institute for Healthcare Improvement. S.S. has received an honorarium from VHA. C.D.S. is a member of the speakers' bureau for Pfizer. R.A.W. has received research grants from Sage Products and the Centers for Disease Control and Prevention and has been a consultant on Tolevamer for Genzyme and a consultant to the Centers for Disease Control and Prevention. D.C. is co-chair of the National Quality Forum Patient Safety Taxonomy Committee and an employee of CSC, a healthcare technology

consulting company, and has ownership in Theradoc, a medical software company. All other authors report no relevant conflicts of interest.

ENDORSER(S)

American Organization of Nurse Executives - Professional Association
Association for Respiratory Care - Professional Association
Infusion Nurses Society - Professional Association
Pediatric Infectious Diseases Society - Professional Association
Society for Hospital Medicine - Professional Association
Society of Critical Care Medicine - Professional Association
Surgical Infection Society - Professional Association

GUIDELINE STATUS

This is the current release of the guideline.

GUIDELINE AVAILABILITY

Electronic copies: Available from the Society for Healthcare Epidemiology of America (SHEA) Web site.

Print copies: Available from the Reprints Coordinator, University of Chicago Press, 1427 E. 60th St., Chicago, IL 60637 (reprints@press.uchicago.edu) or contact the journal office (iche@press.uchicago.edu).

AVAILABILITY OF COMPANION DOCUMENTS

The following are available:

- Improving patient safety through infection control: a new healthcare imperative. Infect Control Hosp Epidemiol 2008;29:S3–S11. Electronic copies: Available from the Society for Healthcare Epidemiology of America (SHEA) Web site.
- A compendium of strategies to prevent healthcare-associated infections in acute care hospitals. Executive summary. Infect Control Hosp Epidemiol 2008;29:S12–S21. Electronic copies: Available from the Society for Healthcare Epidemiology of America (SHEA) Web site.

Print copies: Available from the Reprints Coordinator, University of Chicago Press, 1427 E. 60th St., Chicago, IL 60637 (reprints@press.uchicago.edu) or contact the journal office (iche@press.uchicago.edu).

Performance measures and a urinary catheter reminder form (in appendix) are available in the original guideline document.

PATIENT RESOURCES

The following is available:

- FAQs (frequently asked questions) about ventilator-associated pneumonia. 2008. 1 p.

Electronic copies: Available in English and Spanish from the Society for Healthcare Epidemiology of America (SHEA) Web site.

Please note: This patient information is intended to provide health professionals with information to share with their patients to help them better understand their health and their diagnosed disorders. By providing access to this patient information, it is not the intention of NGC to provide specific medical advice for particular patients. Rather we urge patients and their representatives to review this material and then to consult with a licensed health professional for evaluation of treatment options suitable for them as well as for diagnosis and answers to their personal medical questions. This patient information has been derived and prepared from a guideline for health care professionals included on NGC by the authors or publishers of that original guideline. The patient information is not reviewed by NGC to establish whether or not it accurately reflects the original guideline's content.

NGC STATUS

This NGC summary was completed by ECRI Institute on January 21, 2009. The information was verified by the guideline developer on March 30, 2009.

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